SOURCES OF RESISTANCE TO ROOT-KNOT NEMATODES IN COFFEE: CHARACTERISATION, GENETIC BASES AND PERSPECTIVES [FONTES DE RESISTÊNCIA A NEMATÓIDES DAS GALHAS EM CAFÉ: CARACTERIZAÇÃO, BASES GENÉTICAS E PERSPECTIVAS]

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By introducing coffee in Latin America, this was exposed to a range of root-knot nematodes (RKNs) with some of them proved to be highly pathogens such as the three main species for this crop: *Meloidogyne paranaensis*, *M. incognita* and *M. exigua*. Genetic control, using resistant cultivars, is the mainstay of a low cost integrated RKNs management aiming avoidance of highly-toxic nematicides. The main *Coffea arabica* cultivars traditionally cultivated are highly susceptible to RKNs. Sources of resistance to RKNs were prospected in wild accessions of *C. arabica* and *C. canephora*. Resistance to *M. paranaensis*, *M. incognita* and *M. exigua* and even to some other minor species like *M. arabicida* has been identified in *C. canephora* germplasm. In the case of wild *C. arabica* accessions, resistance to *M. paranaensis*, *M. arabicida* and *M. incognita* have been found. On the other hand, none resistance to *M. exigua* has been found in this species. Resistance phenotypes on coffee have been partially characterized for *M. exigua* and *M. incognita* infestations. However more detailed cellular and molecular characterization of resistance mechanisms to RKNs in coffee roots must be carried out in order to indentify the timing and pathways of the plant responses. Depending on the RKN species and coffee genotypes, different resistance traits have been observed at different infestation steps from penetration restraint to hypersensitive like reactions. These cell death processes were observed during migration of infective J2 in the roots toward the plant vascular system and also in and/or close to giant-cell-formed feeding sites leading to none or weak reproduction of the nematode. Knowledge on inheritance of resistances to RKNs is essential for breeding programs. Among known resistance to RKNs in coffee, only genetic determinism of the resistance to *M. exigua* has been described with the identification of one dominant gene: *Mex-1* whose mapping is in progress looking for nearby markers among a large F2 population segregating for resistance to this nematode. Precise and reliable phenotyping is a key step for genetic studies on plant resistances. For further studies on inheritance of resistance to other RKNs such as to *M. paranaensis*, as well as for mapping the regions carrying the involved R genes, we developed a phenotyping platform that allows a nematode-reproduction-rate based on screening of large number of plant F2 populations in a fast, reliable and reproducible way. On an applied point of view, we aim at the development of RKN R gene marker that will permit a high-throughput assisted selection also more reliable than the phenotypic selection. The next step of research on coffee RKN R genes will be the functional validation of the identified gene sequences. These studies will be shortly initiated in the case of *Mex-1* R gene.